

**II B.Tech I Semester Supplementary Examinations, November 2006**  
**SIGNALS AND MODULATION THEORY**  
**(Electronics & Computer Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) State and prove convolution and modulation properties of F.T.
- (b) Find the F.T of a given function by (figure1)
  - i. Straight forward integration
  - ii. Using the time-integration property.

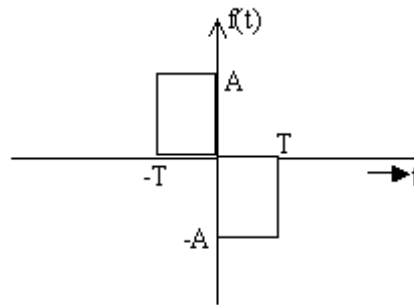


Figure 1

[8+4+4]

2. (a) Determine and plot the auto-correlation function of  $e^{-a|t|}$ .
- (b) Prove that auto correlation function of  $f(t)$  is maximum at the origin. [8+8]
3. (a) Use convolution integral to find the response  $y(t)$  of an LTI system with impulse response  $h(t) = u(t-1)$  to the output  $x(t) = e^{-2t} u(t)$ . Sketch your results.
- (b) A signal with a psd shown in fig. is applied to an ideal High pass filter with a bandwidth of 5 KHz. Find the psd of the filter output and the average normalized power content of the output signal. (figure3b)

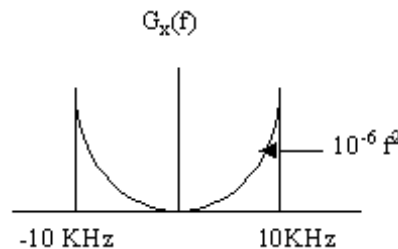


Figure 3b

[8+8]

4. (a) Describe the meaning of each term of the following expression.  
 $V_{am}(t) = 10 \sin(2\pi 500Kt) - 5 \cos(2\pi 515Kt) + 5 \cos(2\pi 485Kt)$

- (b) Describe AM SSBSC. Compare SSB SC to conventional AM. [8+8]
5. An FM wave with modulation index  $\beta=1$  is transmitted through an ideal BPF with mid band frequency  $f_c$  and bandwidth  $5f_m$  where  $f_c$  carrier frequency  $f_m$ : frequency of sinusoidal modulating wave. Determine the amplitude spectrum of the filter output. [16]
6. (a) State and prove sampling theorem in time domain.  
(b) Determine the minimum sampling rate and Nyquist interval for the following signals:  
i.  $\text{Sa}(100t)$   
ii.  $\text{Sa}^2(100t)$   
iii.  $\text{Sa}(100t) + \text{Sa}(50t)$   
iv.  $\text{Sa}(100t) + \text{sa}^2(60t)$ . [8+8]
7. Write short notes on the following:  
(a) 8 QAM  
(b) MSK. [8+8]
8. What are the different waveform patterns of digital signals, explain them. [16]

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